Assessment of genetically modified oilseed rape MS8, RF3 and MS8×RF3 for renewal of authorisation under regulation (EC) No 1829/2003 (application EFSA-GMO-RX-004)

Naegeli, Hanspeter ; Birch, Andrew Nicholas ; Casacuberta, Josep ; De Schrijver, Adinda ; Gralak, Mikołaj Antoni ; Guerche, Philippe ; Jones, Huw ; Manachini, Barbara ; Messéan, Antoine ; Nielsen, Elsa Ebbesen ; Nogué, Fabien ; Robaglia, Christophe ; Rostoks, Nils ; Sweet, Jeremy ; Tebbe, Christoph ; Visioli, Francesco ; Wal, Jean-Michel ; Ardizzone, Michele ; Devos, Yann ; Paraskevopoulos, Konstantinos

Abstract: Following the submission of application EFSA-GMO-RX-004 under Regulation (EC) No 1829/2003 from Bayer CropScience, the Panel on Genetically Modified Organisms of the European Food Safety Authority (GMO Panel) was asked to deliver a scientific risk assessment on the data submitted in thecontext of the renewal of authorisation application of the genetically modified (GM) herbicide-tolerant oilseed rape MS8, RF3 and MS8xRF3. The data received in the context of this renewal application contain post-market environmental monitoring reports, systematic searches and evaluation of literature, updated bioinformatics analyses, and additional documents or studies performed by or on behalf of the applicant. The GMO Panel assessed these data for possible new hazards, modified exposure or new scientific uncertainties identified during the authorisation period and not previously assessed in the context of the original application. Under the assumption that the DNA sequence of the event in oilseed rape MS8, RF3 and MS8xRF3 considered for renewed authorisation is identical to the sequence of the originally assessed event, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on oilseed rape MS8, RF3 and MS8xRF3.

DOI: https://doi.org/10.2903/j.efsa.2017.5067

Wal, Jean-Michel; Ardizzone, Michele; Devos, Yann; Paraskevopoulos, Konstantinos (2017). Assessment of genetically modified oilseed rape MS8, RF3 and MS8×RF3 for renewal of authorisation under regulation (EC) No 1829/2003 (application EFSA-GMO-RX-004). EFSA Journal, 15(11):e05067.
DOI: https://doi.org/10.2903/j.efsa.2017.5067

SCIENTIFIC OPINION

EFSA Journal

ADOPTED: 25 October 2017

doi: 10.2903/j.efsa.2017.5067

Assessment of genetically modified oilseed rape MS8, RF3 and MS8×RF3 for renewal of authorisation under regulation (EC) No 1829/2003 (application EFSA-GMO-RX-004)

EFSA Panel on Genetically Modified Organisms (GMO),
Hanspeter Naegeli, Andrew Nicholas Birch, Josep Casacuberta, Adinda De Schrijver, Mikołaj Antoni Gralak, Philippe Guerche, Huw Jones, Barbara Manachini, Antoine Messéan, Elsa Ebbesen Nielsen, Fabien Nogué, Christophe Robaglia, Nils Rostoks, Jeremy Sweet, Christoph Tebbe, Francesco Visioli, Jean-Michel Wal, Michele Ardizzone, Yann Devos and Konstantinos Paraskevopoulos

Abstract

Following the submission of application EFSA-GMO-RX-004 under Regulation (EC) No 1829/2003 from Bayer CropScience, the Panel on Genetically Modified Organisms of the European Food Safety Authority (GMO Panel) was asked to deliver a scientific risk assessment on the data submitted in the context of the renewal of authorisation application of the genetically modified (GM) herbicide-tolerant oilseed rape MS8, RF3 and MS8×RF3. The data received in the context of this renewal application contain post-market environmental monitoring reports, systematic searches and evaluation of literature, updated bioinformatics analyses, and additional documents or studies performed by or on behalf of the applicant. The GMO Panel assessed these data for possible new hazards, modified exposure or new scientific uncertainties identified during the authorisation period and not previously assessed in the context of the original application. Under the assumption that the DNA sequence of the event in oilseed rape MS8, RF3 and MS8×RF3 considered for renewed authorisation is identical to the sequence of the originally assessed event, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on oilseed rape MS8, RF3 and MS8×RF3.

Keywords: oilseed rape, MS8, RF3 and MS8×RF3, renewal, articles 11 and 23, Regulation (EC) No 1829/2003

Requestor: European Commission

Question number: EFSA-Q-2016-00569

Correspondence: GMO@efsa.europa.eu

Panel members: Andrew Nicholas Birch, Josep Casacuberta, Adinda De Schrijver, Mikołaj Antoni Gralak, Philippe Guerche, Huw Jones, Barbara Manachini, Antoine Messéan, Hanspeter Naegeli, Elsa Ebbesen Nielsen, Fabien Nogué, Christophe Robaglia, Nils Rostoks, Jeremy Sweet, Christoph Tebbe, Francesco Visioli and Jean-Michel Wal.

Acknowledgements: The Panel wishes to thank the members of its standing Working Groups on Molecular Characterisation, Food/Feed and Environmental Risk Assessment for the preparatory work on this scientific opinion.

Suggested citation: EFSA GMO Panel (EFSA Panel on genetically modified organisms), Naegeli H, Birch AN, Casacuberta J, De Schrijver A, Gralak MA, Guerche P, Jones H, Manachini B, Messéan A, Nielsen EE, Nogué F, Robaglia C, Rostoks N, Sweet J, Tebbe C, Visioli F, Wal J-M, Ardizzone M, Devos Y and Paraskevopoulos K, 2017. Scientific opinion on the assessment of genetically modified oilseed rape MS8, RF3 and MS8×RF3 for renewal of authorisation under regulation (EC) No 1829/2003 (application EFSA-GMO-RX-004). EFSA Journal 2017;15(11):5067, 12 pp. https://doi.org/10.2903/j.efsa.2017.5067

ISSN: 1831-4732

The EFSA Journal is a publication of the European Food Safety Authority, an agency of the European Union.

Summary

Following the submission of application EFSA-GMO-RX-004 under Regulation (EC) No 1829/2003[1] from Bayer CropScience, the Panel on Genetically Modified Organisms of the European Food Safety Authority (GMO Panel) was asked to deliver a scientific opinion on the data submitted in the context of the renewal of authorisation application of the genetically modified (GM) herbicide-tolerant oilseed rape (also known as rapeseed). The scope of the renewal application EFSA-GMO-RX-004 covers feed containing or consisting of GM oilseed rape MS8, RF3 and MS8×RF3, excluding cultivation within the European Union (EU), and products other than food and feed containing or consisting of it.

In delivering its scientific opinion, the GMO Panel took into account application EFSA-GMO-RX-004, additional information provided by the applicant, scientific comments submitted by EU Member States and relevant scientific publications. The data received in the context of this renewal application EFSA-GMO-RX-004 contain post-market environmental monitoring reports, an evaluation of the literature retrieved by systematic searches, updated bioinformatics analyses, and additional documents or studies performed by or on behalf of the applicant. The GMO Panel assessed these data for possible new hazards, modified exposure or new scientific uncertainties identified during the authorisation period and not previously assessed in the context of the original application.

In conclusion, under the assumption that the DNA sequences of the events in oilseed rape MS8, RF3 and MS8×RF3 considered for renewed authorisation are identical to the sequences of the originally assessed events, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on oilseed rape MS8, RF3 and MS8×RF3 (EFSA, 2005).

[1] Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed. OJ L 268, 18.10.2003, p. 1–23.

Table of contents

1. Introduction

1.1. Background

On 9 September 2016, the European Food Safety Authority (EFSA) received from the European Commission application EFSA-GMO-RX-004 for the renewal of authorisation of genetically modified (GM) herbicide-tolerant oilseed rape (also known as rapeseed) MS8, RF3 and MS8×RF3 for feed containing or consisting of GM oilseed rape MS8, RF3 and MS8×RF3, excluding cultivation within the European Union (EU), and products other than food and feed containing or consisting of it, submitted by Bayer CropScience under Regulation (EC) No 1829/2003. Before sending the application to EFSA, the European Commission confirmed whether the data submitted in the context of this application were in line with the legal requirements laid down in Articles 11 and 23 of Regulation (EC) No 1829/2003.

After receiving application EFSA-GMO-RX-004, and in accordance with Articles 5(2)(b) and 17(2)(b) of Regulation (EC) No 1829/2003, EFSA informed EU Member States and made the summary of the application available to the public on the EFSA website.[2]

On 21 October 2016, EFSA declared the application valid in accordance with Articles 6(1) and 18(1) of Regulation (EC) No 1829/2003. EFSA made the valid application available to EU Member States and the European Commission, and consulted nominated risk assessment bodies of EU Member States, including national Competent Authorities within the meaning of Directive 2001/18/EC following the requirements of Articles 6(4) and 18(4) of Regulation (EC) No 1829/2003, to request their scientific opinion. EU Member States had three months after the opening of the commenting period (until 20 February 2017) to make their opinion known.

Following the submission of application C/BE/96/01 and the publication of EFSA scientific opinion (EFSA, 2005), the placing on the market of oilseed rape MS8, RF3 and MS8×RF3 for feed consisting and containing of oilseed rape MS8, RF3 and MS8×RF3, excluding cultivation, was authorised by Commission Decision 2007/232/EC.[3] A copy of this authorisation and the notification C/BE/96/01 from the Belgian lead member state were provided by the applicant.[4]

On 1 February 2017, 27 March 2017, 19 June 2017 and 5 July 2017, EFSA received additional information (requested on 2 December 2016, 27 January 2017, 12 April 2017 and 14 June 2017, respectively).

In giving its scientific opinion to the European Commission, EU Member States and the applicant, and in accordance with Articles 6(1) and 18(1) of Regulation (EC) No 1829/2003, EFSA has endeavoured to respect a time limit of 6 months from the acknowledgement of the valid application. As additional information was requested by the EFSA Panel on Genetically Modified Organisms (GMO Panel), the time limit of 6 months was extended accordingly, in line with Articles 6(1), 6(2), 18(1) and 18(2) of Regulation (EC) No 1829/2003.

According to Regulation (EC) No 1829/2003, this scientific opinion is to be seen as the report requested under Articles 6(6) and 18(6) of that Regulation, and thus will be part of the EFSA overall opinion in accordance with Articles 6(5) and 18(5).

1.2. Terms of Reference as provided by the requestor

The GMO Panel was requested to carry out a scientific risk assessment on the data submitted in the context of a renewal of authorisation application for oilseed rape MS8, RF3 and MS8×RF3 for feed containing or consisting of this GM oilseed rape for import and processing in accordance with Articles 11 and 23 of Regulation (EC) No 1829/2003.

Where applicable, any conditions or restrictions which should be imposed on the placing on the market and/or specific conditions or restrictions for use and handling, including post-market monitoring requirements based on the outcome of the risk assessment and, in the case of GMOs or food/feed containing or consisting of GMOs, conditions for the protection of particular ecosystems/environment and/or geographical areas, should be indicated in accordance with Articles 6(5)(e) and 18(5)(e) of Regulation (EC) No 1829/2003.

[2] Availiable online: http://registerofquestions.efsa.europa.eu/roqFrontend/questionDocumentsLoader?question=EFSA-Q-2016-00569

[3] Commission Decision of 26 March 2007 concerning the placing of the market, in accordance with Directive 2001/18/EC of/the European Parliament and of the Council, of oilseed rape products (*Brassica napus* L., lines MS8, RF3 and MS8×RF3) genetically modified for tolerance to the herbicide glufosinate-ammonium (notified under document number C(2007) 1234). (2007/232/EC).

[4] Technical dossier – Section (a) and Annex 1.

The GMO Panel was not requested to give an opinion on information required under Annex II to the Cartagena Protocol. Furthermore, the GMO Panel did not consider proposals for labelling and methods of detection (including sampling and the identification of the specific transformation event in the food/feed and/or food/feed produced from it), which are matters related to risk management.

2. Data and methodologies

2.1. Data

The data for application EFSA-GMO-RX-004 provided by the applicant at the time of submission, or in reply to requests for additional information are specified below.

The sequences of MS8 and RF3 events have been confirmed by resequencing the original material.[5] However, no sequencing data using material from plants imported into the EU close to the time of the submission of this renewal application were submitted. Therefore, in accordance with the GMO Panel guidelines for renewal of applications of GM food/feed authorised under Regulation (EC) No 1829/2003 (EFSA GMO Panel, 2015), the GMO Panel evaluated the data provided in the context of this oilseed rape MS8, RF3 and MS8×RF3 renewal application under the assumption that the event sequence is identical to the sequence of the originally assessed event.

2.1.1. Post-market monitoring reports[6]

Based on the outcome of the initial risk assessment, a post-market monitoring plan for monitoring of GM feed was not required by the authorisation decision. The implementation of a post-market environmental monitoring (PMEM) plan, consisting of a general surveillance plan to check for any adverse effects on the environment arising from oilseed rape MS8, RF3 and MS8×RF3, was a condition for the authorisation. As no potential adverse environmental effects were identified in the environmental risk assessment (ERA) of oilseed rape MS8, RF3 and MS8×RF3 (EFSA, 2005), case-specific monitoring was not considered necessary by the GMO Panel.

The applicant provided eight annual PMEM reports covering a reporting period from May 2007 till September 2015. The annual PMEM plans submitted by the applicant include: (1) the description of a centralised system established by EuropaBio for the collection of information recorded by various operators (federations involved in oilseed rape seeds import and processing) on any observed adverse effect(s) on human health and the environment arising from handling of oilseed rape possibly containing MS8, RF3 and MS8×RF3 seeds; (2) the reports of the surveillance activities conducted by such operators; and (3) the review of relevant scientific peer-reviewed studies retrieved from literature searches, where applicable.

The applicant provided an overall assessment of the annual PMEM reports in the renewal application.

2.1.2. Systematic search and evaluation of literature[7]

As part of the annual PMEM reports, eight separate literature searches were provided covering a reporting period from September 2005 till September 2015. Search terms and databases were not consistent throughout the reports. Therefore, the applicant performed a systematic literature search covering the period from May 2007 to May 2016, identifying six relevant publications. The GMO Panel noted that the retrieved publications were evaluated by the applicant only for their potential relevance to food/feed safety of oilseed rape MS8, RF3 and MS8×RF3, and not for their relevance for environmental safety. As requested on 2 December 2016 by the GMO Panel, a new systematic literature search, covering a period from May 2007 to November 2016, was performed for oilseed rape MS8, RF3 and MS8×RF3, and the newly expressed Barnase, Barstar, and PAT/BAR proteins. The retrieved publications were evaluated for their potential relevance for food/feed safety, molecular characterisation, and environmental safety. The applicant searched several general and subject-specific databases to identify relevant publications. Altogether 768 publications were retrieved. After applying the eligibility/inclusion criteria defined *a priori* by the applicant, 12 publications were identified as

[5] Technical dossier – Section (c), Annex 3 and additional information: 27/3/2017.
[6] Technical dossier – Section (b) and Annex 2.
[7] Technical dossier – Section (c), Annex 3 and additional information: 1/2/2017 and 19/6/2017.

relevant for food/feed safety assessment, molecular characterisation and environmental safety assessment. The list of relevant publications identified by the applicant through the systematic literature searches described above is listed in Appendix A.[8]

2.1.3. Updated bioinformatic data[9]

At the time of submission of the renewal application, the applicant provided a bioinformatics package for oilseed rape single events MS8 and RF3 used to produce the MS8×RF3 stack, including an analysis of the insert and flanking sequences and an analysis of the potential similarity to allergens or toxins of the newly expressed proteins and of all possible open reading frames (ORFs) within the insert and spanning the junction sites. The bioinformatics package also included an analysis of possible horizontal gene transfer (HGT). On 12 April 2017, the GMO Panel requested a new bioinformatics package with up to date databases. The applicant replied to this request on 5 July 2017.

2.1.4. Additional documents or studies provided by the applicant[10]

In line with the renewal guidance requirements (EFSA GMO Panel, 2015), the applicant provided an overview of the worldwide approvals of oilseed rape MS8, RF3 and MS8×RF3, and a list containing the summaries of all studies performed by or on behalf of the applicant over the course of the authorisation period and not previously submitted to the EU (Appendix B). The relevance of the listed studies for molecular characterisation, human and animal safety and the environment was assessed by the applicant. On 2 December 2016, the GMO Panel requested to the applicant the full study reports of twenty studies considered potentially relevant for safety assessment. The applicant submitted the requested information on 1 February 2017.

2.1.5. Overall assessment as provided by the applicant[11]

In line with the requirements listed in the renewal guidance (EFSA GMO Panel, 2015), the applicant provided an overall assessment on whether the collected information in the application for renewal of authorisation of oilseed rape MS8, RF3 and MS8×RF3 for feed use, import and processing in the EU, challenges the conclusions of the original risk assessment (EFSA, 2005).

2.1.6. Monitoring plan and proposal for improving the conditions of the original authorisation[12]

The applicant indicated in the application that the environmental monitoring plan is appropriate and does not need any changes.

2.2. Methodologies

The GMO Panel assessed the application for renewal of the authorisation of oilseed rape MS8, RF3 and MS8×RF3 for feed uses, import and processing in accordance with Articles 11 and 23 of Regulation (EC) No 1829/2003. The GMO Panel took into account the requirements described in its guideline for the risk assessment of renewal applications of GM food/feed authorised under Regulation (EC) No 1829/2003 (EFSA GMO Panel, 2015).

The comments raised by EU Member States are addressed in Annex G of EFSA's overall opinion,[13] and were taken into consideration during the scientific risk assessment.

[8] A total of 13 relevant publications were considered in the assessment, as listed in Appendix A. These included one publication identified in the search covering the reporting period from May 2007 to May 2016, and the 12 publications identified in the search performed covering the reporting period from May 2007 to November 2016. Five out of six publications identified by the applicant as relevant in the first systematic search (i.e. May 2007 to May 2016) were also identified in the second systematic search (i.e. May 2007 to November 2016).

[9] Technical dossier – Section (c), Annex 3.2 and additional information: 5/7/2017 and 3/10/2016 (during completeness check).

[10] Technical dossier – Section (c), Annex 3.3 and additional information: 1/2/2017.

[11] Technical dossier – Section (c).

[12] Technical dossier – Section (d).

[13] Availiable online: http://registerofquestions.efsa.europa.eu/roqFrontend/questionDocumentsLoader?question=EFSA-Q-2017-00713

3. Assessment

3.1. Evaluation of the post-market environmental monitoring reports

During the general surveillance activities covering the authorisation period of oilseed rape MS8, RF3 and MS8×RF3, no adverse effects were reported by the applicant.

3.2. Evaluation of the systematic search and evaluation of literature

The GMO Panel assessed the publications listed in Appendix A and considers that none of them gave rise to any safety concern for human and animal health and the environment which would change the original risk assessment conclusions on oilseed rape MS8, RF3 and MS8×RF3 (EFSA, 2005).

3.3. Evaluation of the updated bioinformatic data

The results of the bioinformatics analyses performed for oilseed rape events MS8 and RF3 confirm that no known endogenous genes are interrupted by the inserts. Analyses of the amino acid sequence of the newly expressed Barnase, Barstar and PAT proteins reveal no significant similarities to toxins and allergens. In addition, bioinformatics analyses of the newly created ORFs within the inserts or spanning the junctions with genomic DNA reveal no significant similarities to known toxins and allergens.

The sequence identity analysis of the regions of bacterial origin in oilseed rape events MS8 and RF3 did not identify elements with sufficient length and identity to support homologous recombination (EFSA, 2015). There is no new information that would change the previous conclusion of the GMO Panel, therefore the unlikely, but theoretically possible, horizontal transfer of recombinant genes from oilseed rape MS8 and RF3 to bacteria does not raise any environmental safety concern.

3.4. Evaluation of the additional documents or studies provided by the applicant

The GMO Panel evaluated the summary and/or the full study reports of the additional studies provided and listed in Appendix B. This new information does not raise any concern for human and animal health and the environment, which would change the original risk assessment conclusions on oilseed rape MS8, RF3 and MS8×RF3.

3.5. Evaluation of the monitoring plan and proposal for improving the conditions of the original authorisation

The PMEM plan followed by the applicant consists mainly of general surveillance of imported GM oilseed rape plant material, including oilseed rape MS8, RF3 and MS8×RF3. This general surveillance is coordinated by EuropaBio and implemented by selected operators (federations involved in oilseed rape import and processing). In addition, the applicant reviews relevant scientific publications retrieved from literature searches on an annual basis. As mentioned in Section 2.1.6, the applicant considers that this plan does not need any changes. The GMO Panel is of the opinion that the scope of the plan provided by the applicant is consistent with the scope of oilseed rape MS8, RF3 and MS8×RF3, but notes that monitoring is related to risk management and that the final adoption of the PMEM plan falls outside the mandate of EFSA.

4. Conclusions

Under the assumption that the DNA sequences of the oilseed rape events MS8, RF3 and MS8×RF3 considered for renewed authorisation are identical to the sequences of the originally assessed events, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on oilseed rape MS8, RF3 and MS8×RF3 (EFSA, 2005).

Documentation provided to EFSA

1) Letter from the European Commission to EFSA received on 9 September 2016 for the continued marketing of genetically modified oilseed rape MS8, RF3, MS8×RF3 in accordance with articles 11 and 23 of Regulation (EC) No 1829/2003 by Bayer CropScience (EFSA-GMO-RX-004).
2) Acknowledgement letter dated 20 September 2016 from EFSA to European Commission.
3) Letter from EFSA to applicant dated 21 October 2016 delivering the 'Statement of Validity' for application EFSA-GMO-RX-004.
4) Letter from EFSA to applicant dated 2 December 2016 requesting additional information.
5) Letter from EFSA to applicant dated 27 January 2017 requesting additional information.
6) Letter from applicant to EFSA received on 1 February 2017 providing additional information.
7) Letter from applicant to EFSA received on 27 March 2017 providing additional information.
8) Email from EFSA to applicant dated 29 March 2017 re-starting the clock on 27 March 2017.
9) Letter from EFSA to applicant dated 12 April 2017 requesting additional information.
10) Letter from EFSA to applicant dated 14 June 2017 requesting additional information.
11) Letter from applicant to EFSA received on 19 June 2017 providing additional information.
12) Letter from applicant to EFSA received on 5 July 2017 providing additional information.
13) Email from EFSA to applicant dated 11 July 2017 re-starting the clock on 5 July 2017.

References

EFSA, 2005. Opinion of the Scientific Panel on Genetically Modified Organisms on a request from the Commission related to the application (Reference C/BE/96/01) for the placing on the market of glufosinate-tolerant hybrid oilseed rape Ms8×Rf3, derived from genetically modified parental lines (Ms8, Rf3), for import and processing for feed and industrial uses, under Part C of Directive 2001/18/EC from Bayer CropScience. EFSA Journal 2005;3(10):281, 23 pp. https://doi.org/10.2903/j.efsa.2005.281

EFSA (European Food Safety Authority), 2015. Explanatory note on DNA sequence similarity searches in the context of the assessment of horizontal gene transfer from plants to microorganisms. EFSA Supporting Publication 2015:12(12);EN-916, 10 pp. https://doi.org/10.2903/sp.efsa.2015.en-916

EFSA GMO Panel (EFSA Panel on Genetically Modified Organisms), 2015. Guidance for renewal applications of genetically modified food and feed authorised under Regulation (EC) No 1829/2003. EFSA Journal 2015;13(6):4129, 8 pp. https://doi.org/10.2903/j.efsa.2015.4129

Abbreviations

ERA	environmental risk assessment
GM	genetically modified
GMO	genetically modified organisms
HGT	horizontal gene transfer
ORFs	open reading frames
PMEM	post-market environmental monitoring report

Appendix A – List of relevant publications identified by the applicant through the systematic literature searches

Reference
Baktavachalam GB, Delaney B, Fisher TL, Ladics GS, Layton RJ, Locke MEH, Schmidt J, Anderson JA, Weber NN, Herman RA, Steven L and Evans SL, 2015. Transgenic maize event TC1507: global status of food, feed, and environmental safety. GM crops & food, 6, 2164–5698.[(a)]
Chen H, 2012. Exploiting the intron-splicing mechanism of insect cells to produce viral vectors harboring toxic genes for suicide gene therapy. Molecular Therapy Nucleic Acids, 1, 57.[(a),(b)]
Fard NA, Minuchehr Z and Mousavi A, 2013. Allergenicity study of genetically modified herbicide resistant crops (bioinformatics assessment). Bulletin of Environment, Pharmacology and Life Sciences, 2, 24–32.[(b)]
Fard NA, Minuchehr Z and Mousavi A, 2013. In silico allergenicity assessment of novel proteins derived from GMHR crops. Ortuno, F [Editor]; Rojas, I [Editor]. 2013 pp. 275. Proceedings IWBBIO 2013: International Work-Conference on Bioinformatics and Biomedical Engineering. 978-84-15814-13-9(S).[(b)]
Kim JH, Park SB, Hong Y and Kim HY, 2015. Detection of eight genetically modified canola events using two event-specific pentaplex PCR systems. Food Control, 51, 183–189.[(b)]
Schulze J, Frauenknecht T, Brodmann P and Bagutti C, 2014. Unexpected diversity of feral genetically modified oilseed rape (*Brassica napus* L.) despite a cultivation and import ban in Switzerland. PloS one, 9, 2–18.[(b)]
Schulze J, Brodmann P, Oehen B, Bagutti C, 2015. Low level impurities in imported wheat are a likely source of feral transgenic oilseed rape (*Brassica napus L*.) in Switzerland. Environmental Science and Pollution Research, 22, 16936–16942.[(b)]
Siruguri V, Bharatraj DK, Vankudavath RN, Mendu VV, Gupta V and Goodman RE, 2015. Evaluation of Bar, Barnase, and Barstar recombinant proteins expressed in genetically engineered *Brassica juncea* (Indian mustard) for potential risks of food allergy using bioinformatics and literature searches. Food and Chemical Toxicology, 83, 93–102.[(a),(b)]
Sun HJ, Kang HG, Bae TW, Cho TG, Kim JK, Lim PO, Riu KZ and Lee HY, 2010. Assessment of Phosphinothricin Acetyltransferase (PAT) Degradation From Transgenic Zoysiagrass Digested with Simulated Gastric Fluid (SGF). Journal of Plant Biology, 53, 113–120.[(a),(b)]
Verma AK, Misra A, Subash S, Das M and Dwivedi PD, 2011. Computational allergenicity prediction of transgenic proteins expressed in genetically modified crops. Immunopharmacology and Immunotoxicology, 33, 412–422.[(a),(b)]
Wu G, Wu Y, Xiao L and Lu C, 2008. Event-specific qualitative and quantitative polymerase chain reaction methods for detection of genetically modified rapeseed Ms8xRf3 based on the right border junctions. Journal of AOAC International, 91, 143–151.[(b)]
Xiao L, 2009. Gene transferability from transgenic *Brassica napus* L. to various subspecies and varieties of Brassica rapa. Transgenic Research, 18, 733–746.[(b)]
Xu W, Guo F, Zhou X, Shang Y, Yuan Y, Zhang F and Huang K, 2011. Unintended effects were investigated in antioxidant activity between genetically modified organisms and their nontransgenic control. African Journal of Biotechnology, 10, 9272–9279.[(a),(b)]

(a): Publications identified in the systematic literature search covering the reporting period from May 2007 to May 2016.
(b): Publications identified in the systematic literature search covering the reporting period from May 2007 to November 2016.

Appendix B – List of additional studies performed by or on behalf of the applicant over the course of the authorisation period and not previously submitted to the EU with regard to the evaluation of the safety of the food/feed for humans, animal or the environment from oilseed rape MS8, RF3 and MS8xRF3

Study identification	Title
M-365250-01-1[(a)]	Barstar protein - acute toxicity by oral gavage in mice
M-390154-02-1[(a)]	Nutritional impact assessment report for Glufosinate-ammonium tolerant Brassica napus transformation events RF3
M-429793-01-1[(a)]	Barstar protein *in vitro* digestibility study in human simulated gastric fluid at pH 1.2
M-429800-01-1[(a)]	Barstar protein *in vitro* digestibility study in human simulated intestinal fluid
M-433396-01-1[(a)]	The heat stability of microbially produced Barstar assessed by SDS-PAGE and western blot analyses
M-440532-01-1[(a)]	The heat stability of microbially produced Barnase assessed by SDS-PAGE and western blot analyses
M-441807-01-1[(a)]	Literature review for safety assessment of the phosphinothricin acetyltransferase (PAT) protein form January 2004 to October 2012
M-461494-01-1[(a)]	Recombinant PAT/bar protein: acute toxicity by oral gavage in female mice
M-468940-01-1[(a)]	Recombinant barnase/barstar complex protein: acute toxicity by oral gavage in mice
M-470988-01-1[(a)]	Broiler chicken feeding study with RF3 canola
M-474414-01-1[(a)]	Recombinant Barnase protein - acute toxicity by oral gavage in mice
M-475319-01-1[(a)]	PAT/bar protein - acute toxicity by oral gavage in mice
M-475710-01-1[(a)]	The effect of temperature on microbially produced barnase assessed by ELISA
M-476903-01-1[(a)]	Recombinant barnase/barstar complex protein: *in vitro* digestibility study in human simulated gastric fluid at pH 1.2
M-476904-01-1[(a)]	Recombinant barnase/barstar complex protein: *in vitro* digestibility study in human simulated intestinal fluid
M-477906-01-1[(a)]	The effect of temperature on microbially produced barnase/barstar protein complex assessed by ELISA
M-490632-01-1[(a)]	The effect of temperature on microbially produced barnase assessed by the barnase quantitative activity assay
M-492536-01-1[(a)]	The effect of temperature on microbially-produced barnase/barstar complex protein assessed by the barnase quantitative activity assay and the barstar quantitative activity assay
M-497799-02-1[(a)]	Barnase protein - acute toxicity study by oral gavage in mice
M-499084-01-1[(a)]	Barstar protein: acute toxicity study by oral gavage in mice
M-304059-01-1	Analysis of floral morphology and pollen viability of transgenic MS11, RF3 and MS11×RF3 *Brassica juncea* lines in comparison with their non-transgenic counterpart
M-304071-01-1	Analysis of floral morphology and pollen viability of transgenic MS11, RF3 and MS11×RF3 *Brassica napus* lines in comparison with their non-transgenic counterpart
M-306720-01-1	Herbicide tolerance of MS11, RF3 and MS11xRF3 in *Brassica napus* and *Brassica juncea* lines
M-307894-01-1	Structural stability analysis of Brassica events MS11, RF3 and MS11xRF3
M-348453-01-1	Analysis of floral morphology and pollen viability of transgenic Brassica napus lines carrying the events MS8, RF3 and RT73
M-364279-02-1	Stability of male sterility trait in MS8 and MS8×RF3, male fertility in RF3 and RT73, and stability of the restoration in hybrid MS8×RF3×RT73 in different environments
M-411376-01-1	Reporting of oilseed rape transformation event MS8 - Southern blot data obtained in the year 1999
M-411450-01-1	Protein equivalence of the PAT/bar protein in oilseed rape lines MS8, RF3, MS8xRF3 and the bacterially produced PAT/bar protein
M-430566-01-1	Characterization of PAT/bar isolated from the *Brassica napus* transformation event MS8

Study identification	Title
M-430567-01-1	Characterization of PAT/bar isolated from the *Brassica napus* transformation event RF3
M-430568-01-1	Characterization of PAT/bar isolated from the *Brassica napus* transformation event MS8×RF3
M-445162-01-1	Mass spectrometry characterization of a PAT/bar protein sample purified from *Brassica napus* MS8 plants by molecular weight determination of the intact sample, peptide mapping and N-terminal sequencing
M-445164-01-1	Mass spectrometry characterization of a PAT/bar protein sample purified from *Brassica napus* RF3 plants by molecular weight determination of the intact sample, peptide mapping and N-terminal sequencing
M-445166-01-1	Mass spectrometry characterization of a PAT/bar protein sample purified from *Brassica napus* MS8RF3 plants by molecular weight determination of the intact sample, peptide mapping and N-terminal sequencing
M-458413-01-1	Full DNA sequence of the transgenic and pre-insertion locus of *Brassica napus* transformation event RF3
M-458417-01-1	Full DNA sequence of the transgenic and pre-insertion locus of *Brassica napus* transformation event MS8
M-488334-01-1	Comparative assessment of MS8×RF3×RT73, MS8 and RF3 *Brassica napus* tolerance to glufosinate herbicide
M-493314-01-1	Comparative assessment of MS8×RF3×RT73, MS8 and RF3 *Brassica napus* tolerance to glufosinate and MS8×RF3×RT73 and RT73 to glyphosate herbicide
M-500088-01-1	Confirmation of the absence of vector backbone sequences in *Brassica napus* MS8
M-500404-01-1	Quantitative protein expression analysis of Barnase and Barstar proteins in leaf, seed, and whole above- ground plant matrices of MS8×RF3×RT73 canola, MS8 canola, and RF3 canola grown in Canada in 2011
M-517801-03-1	Summary of the systematic literature review for the oilseed rape transformation event MS8×RF3×GT73
M-533563-01-1	Structural stability analysis of *Brassica napus* RF3
M-533715-01-2	MS11 and RF3 Brassica napus - seed cold tolerance, 2015
M-534293-01-1	Confirmation of the absence of vector backbone sequences in *Brassica napus* RF3
M-537791-01-2	MS11×RF3 *B. napus*, MS11 *B. napus* and RF3 *B. napus* - Comparative assessment of tolerance to glufosinate-ammonium herbicide, 2015
M-542702-01-1	MS11×RF3, MS11, and RF3 *Brassica napus* - protein expression analyses of field samples grown in Canada and the USA during 2014

(a): Studies for which the full report was requested by the GMO Panel.